

# Arizona Cardiovascular Disease State Plan









"Coming together is a beginning, staying together is progress, and working together is success."

- Henry Ford



#### Dear Arizona Residents:

The combination of heart disease and stroke is the number one cause of death in Arizona. In 2003, cardiovascular disease accounted for 30 percent of the deaths in Arizona, or one out of every three deaths. Despite increased awareness of the risk factors for cardiovascular disease such as high cholesterol, high blood pressure, poor nutrition, and lack of physical activity, cardiovascular disease continues to be the leading cause of death in Arizona and the nation. The growing population of baby boomers, who are at an increased risk of developing chronic diseases, and the popularity of Arizona as a retirement destination, makes it necessary to implement programs and interventions that are designed to reduce death and disability from cardiovascular disease.

The Arizona Cardiovascular Disease Prevention Plan for the State of Arizona is the result of hard work by members of the Arizona Cardiovascular Disease Coalition. This state plan represents input from key individuals representing community, health, and educational institutions, as well as tribes and public agencies throughout Arizona.

This plan is designed to assist stakeholders, policy makers, health care professionals, educators and public health workers to develop and coordinate approaches for cardiovascular disease prevention in their respective populations.

Successful implementation of the plan will require participation and coordinated efforts among communities, organizations and individuals. Partnerships between state, public, private and volunteer agencies will be essential to positively impact cardiovascular health in Arizona. While the development of a state plan is only the beginning, it is an important step in building a statewide program to address cardiovascular disease prevention in the state of Arizona.

Sincerely,

Susan Gerard

Director

#### **Acknowledgements**

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#### **Executive Summary**

Cardiovascular disease (CVD) is the leading cause of death in Arizona. Cardiovascular disease, which includes heart disease and stroke, accounts for more than 30 percent of the deaths in Arizona in 2003 and CVD claimed more than 138,000 lives over the past ten years. 1 In addition to the lives lost as a result of cardiovascular disease, approximately 4,195 per 100,000 people living in Arizona are living with heart disease and 2,457 per 100,000 people are living with cerebrovascular disease, the disease that leads to a stroke. As the number of people living with CVD continues to rise, and the state's population continues to age, the health and economic burden of cardiovascular disease will greatly impact the population's health status.

The Cardiovascular Disease Prevention Plan for the State of Arizona outlines a comprehensive approach to reducing the burden of cardiovascular disease through the most efficient, cost-effective, and evidence-based strategies available. This plan supports current efforts in primary prevention and proposes new primary prevention activities that are specific to cardiovascular disease. The majority of the plan addresses secondary prevention efforts and controlling risk factors in those who already have cardiovascular disease.

The long-term objectives to address cardiovascular disease in Arizona are:

 Reduce the number of coronary deaths in Arizona by 25 percent, by the year 2010, in conjunction with the American Heart Association's impact goal and achieving the Healthy People 2010 goal.

- Reduce the number of stroke deaths in Arizona by 20 percent by the year 2010.
- Decrease the number of Arizonans diagnosed with Cardiovascular Disease by 20 percent by the year 2020.
- Increase the proportion of adults aged 20
  years and older that are aware of the early
  warning signs and symptoms of a heart attack
  and the importance of seeking immediate
  medical attention.
- Increase the proportion of adults who are aware of the early warning signs and symptoms of a stroke and the importance of seeking immediate medical attention.
- Establish a surveillance system to accurately identify the true burden of Cardiovascular Disease in the state of Arizona.
- Establish a core team, comprised of physicians, hospital groups, public health professionals and community members, that will advise the Arizona Department of Health Services (ADHS) Cardiovascular Risk Reduction Program on the activities necessary to meet the long-term state plan objectives.

This release of the Cardiovascular Disease Prevention Plan for the State of Arizona is the first step to significantly reducing heart disease and stroke mortality and morbidity in Arizona. Achieving the objectives set forth in this plan will take a coordinated effort from many organizations. Using this plan to guide activities, and working in coordination, can reduce the death and disability from heart disease and stroke in Arizona.

# Vision: Reduce death and disability from Cardiovascular Disease in Arizona. Mission: The mission of the Arizona State Plan on Cardiovascular Disease is to reduce the death and disability associated with all cardiovascular diseases, particularly heart disease and stroke, using the most efficient, cost-effective and evidence-based strategies available.

#### Introduction

Cardiovascular disease (CVD) refers to conditions and diseases of the heart and blood vessels, including, but not limited to, coronary artery disease (CAD), heart attack, stroke, high blood pressure, congestive heart failure and congenital heart diseases. CVD has been the leading cause of death every year since the early 1900s. Despite the increase in scientific knowledge and health awareness that has occurred since that time, CVD continues to be the most prevalent health problem in the U.S., surpassing other diseases such as diabetes and all forms of cancer combined. According to the Centers for Disease Control and Prevention (CDC), approximately Americans die from CVD each year, which is one death every 33 seconds.<sup>2</sup> Additionally approximately 31 million Americans, or one-fourth of the U.S. population, are currently living with some form of CVD.

The costs of heart disease and stroke continue to increase annually. In 2004, the estimated cost of heart disease and stroke was \$368 billion, which is an increase of \$17 billion over the costs in 2003. The financial impact of treating CVD will not only be affected by inflation, but also by the advent of new procedures and the growing population over the age of 65 years old.

Coronary artery disease (CAD) occurs when the arteries that supply blood to the heart muscle become hardened and narrow. This hardening is a result of plaque build-up on the inner walls of the artery, a process that is called atherosclerosis. The narrowing restricts blood and oxygen flow to the heart. If the narrowing is severe enough, angina or a heart attack can occur.

Angina is chest pain or discomfort that occurs when the heart is not getting enough blood or oxygen. Heart attacks, also known as myocardial infarctions (MI), occur when the blood supply to the heart is decreased or stopped. The result of a heart attack is death of at least part of the heart tissue; the severity of the MI is determined by the location and size of the blockage. CAD is the most common form of heart disease and is the leading cause of death in both men and women. If a person has CAD over an extended period of time, it can weaken the heart muscle and contribute to arrhythmias, or changes in the normal heart beat pattern, and heart failure.

Congestive heart failure (CHF) is a condition where blood output of the heart is significantly reduced and is usually the result of an MI, ischemia, cardiomyopathy, cardiomegaly, heart muscle weakening, high blood pressure, a defect in the muscular wall or valves, or other medical conditions. Approximately five million people across the U.S. are living with CHF, and 550,000 new cases are diagnosed each year. requires intensive follow-up between the patient and the medical team. Preventing complications such as pulmonary and peripheral edema, arrhythmia and electrolyte abnormalities can significantly decrease the cost of treating CHF, as well as lessen the potential for disability associated with this condition.

When atherosclerosis affects the blood vessels in and around the brain, ischemia can develop that could result in the death of brain tissue. This tissue death is often called a cerebrovascular accident, commonly known as a stroke.

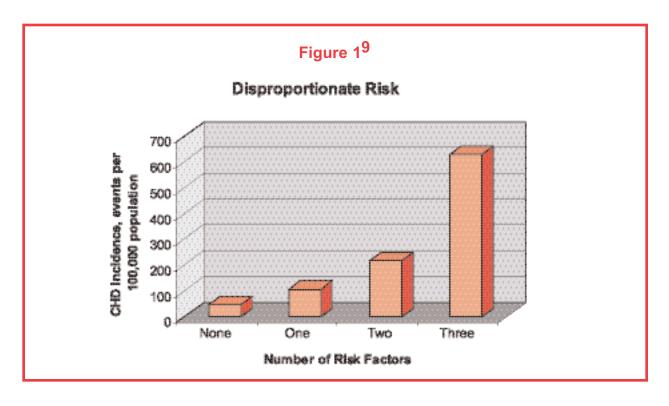
An acute stroke can occur when a blood vessel carrying oxygen and nutrients to the brain is either blocked by a thrombus or embolus, or when the vessel dissects and causes intercranial bleeding and significant disruption in the blood flow of the brain. As with a heart attack, disruption of blood flow causes part of the brain to be deprived of the nutrients and oxygen it needs and it begins to die. Blocked arteries cause 88 percent of strokes; these would be classified as ischemic strokes. The other type is a hemorrhagic stroke, where an aneurysm or thin, weakened area of a blood vessel ruptures. This is also known as "bleeding" stroke. As part of the brain tissue dies from a lack of oxygen, the area of the body it controls is affected. Someone who has suffered from a stroke may be paralyzed, have language or vision problems, or die if the stroke affected the higher brain centers that control breathing or movement of critical areas in the body. In the U.S., stroke is the third leading cause of death, and in the year 2000, accounted for 167,661 deaths. There are approximately 700,000 strokes each year, with 200,000 occurring in patients who have suffered a prior stroke. It is alarming, given the high prevalence of stroke in our country that the general public is largely unaware of the signs of stroke and that it is a medical emergency requiring immediate attention. Treatments for acute coronary syndromes and stroke, which would dissolve a thrombus and stop a stroke or heart attack from progressing, are available and would minimize the damage to the brain or heart and the associated disability. Unfortunately, these treatments are very time-sensitive and need to be initiated within three hours of the stroke or heart attack. There is a great necessity in Arizona to develop the "Chain of Survival" for stroke so that it is as proficient as the chain for cardiac emergencies. Primary stroke centers, certified by the Joint Commission on the

Accreditation of Health Organizations (JCAHO), will dramatically increase the effectiveness of the "Chain of Survival" for stroke, and are an important step in decreasing the death and disability of CVD.

In the past 20 years, mortality from CVD has declined; however, this decline slowed during the 1990s for heart disease and was static for stroke. This is because more people are living with the disease rather than dying from it. In fact, since 1975, the number of people living with CHF has increased.

Given that the leading risk factors for CVD, smoking, physical inactivity, high cholesterol, high blood pressure, diabetes and obesity, are modifiable, it is surprising that it is the leading cause of death in the U.S. and Arizona. The contributing risk factors for CVD are poor nutrition and stress. Poor nutrition, both in the form of ingesting too many calories and by ingesting foods that are high in fat and salt, contribute to many of the major risk factors. Other chronic diseases, such as diabetes, arthritis, osteoporosis, and kidney disease, may have significant impact on the development and treatment of heart disease and stroke.

When classifying a risk factor as a major modifiable risk factor it is important to consider independence, disproportionate risk, and dose response. Independence means that smoking, or exposure to environmental tobacco smoke (ETS), physical inactivity, high blood pressure, high cholesterol and obesity are considered to cause heart disease and stroke by independent mechanisms.



Disproportionate risk refers to the observation that the presence of modifiable risk factors dramatically increases one's risk for developing heart disease and stroke and that risk is increased exponentially when additional risk factors are present in an individual. Dose response means that those individuals who are the least active, use the most tobacco, have the highest blood pressure and cholesterol levels and are the most overweight or obese are more likely to develop heart disease and/or stroke than their counterparts. Figure 1, based on Framingham Heart Study data, shows the increased risk of developing heart disease and stroke when additional risk factors are present.

It is also important to consider the non-modifiable risk factors for heart disease and stroke, such as age, gender, and family history. These risk factors, although non-modifiable, are useful in assessing one's risk for developing CVD, interpreting the thresholds for other modifiable risk factors, and interpreting screening and diagnostic tests for heart disease and stroke. For example, an individual in his/her 40s and who

has a strong family history of heart disease and/or stroke may decide, along with their medical team, that it is prudent to lower their blood pressure and cholesterol levels to below what would be considered normal for individuals of the same age without a family history.

Currently, the CDC provides funding for 32 programs across the U.S. to improve the cardiovascular health of Americans.

The priorities of these programs are to: 10

- · Control high blood pressure;
- Control high cholesterol;
- Increase the awareness of the signs and symptom of heart disease and stroke and the importance of calling 911 when these signs and symptom occur;
- Improve emergency response;
- Improve quality of care; and
- Eliminate disparities.

Addressing modifiable risk factors for heart disease and stroke might have an effect on other chronic diseases such as cancer, diabetes, arthritis and depression. Also, interventions aimed at modifying one modifiable risk factor may positively affect other risk factors and have a near-multiplicative reduction in the risk of developing heart disease and/or stroke. Of those that are modifiable, physical activity (PA), in particular, has the most significant effect on the other risk factors for heart disease and stroke.

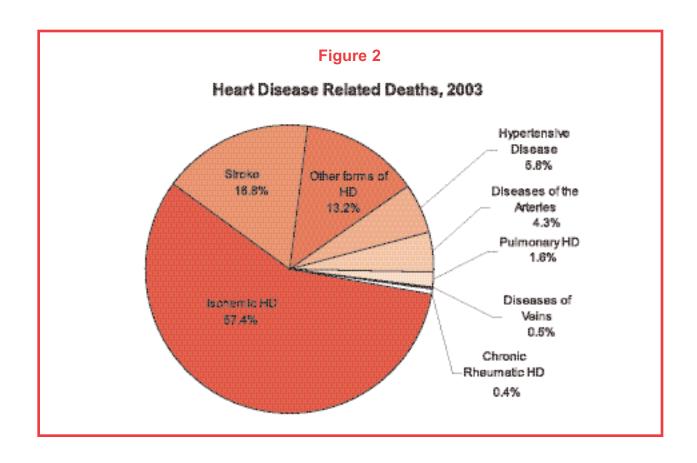
PA has been shown to increase the efficacy of smoking cessation programs, reduce Body Mass Index (BMI), waist circumference, waist to hip ratio and body fat percentage, lower total cholesterol, lower blood pressure, and improve insulin sensitivity. Addressing risk factors individually instead of as a group could still reduce heart disease and stroke significantly. According to the American Heart Association (AHA), if all major forms of heart disease and stroke were eliminated the life expectancy of Americans would increase by almost 10 years.



#### **Burden of Cardiovascular Disease in Arizona**

Cardiovascular disease is a collection of diseases, most of which affect the blood vessels of the human body and restrict blood supply. Heart disease, the leading cause of death in Americans, is a broad term for any disease that affects the heart muscle itself. Coronary Artery Disease (CAD) is the largest form of heart disease and is a condition that affects the blood flow to the heart. Generally arteriosclerosis and atherosclerosis cause impairment in the function of the coronary arteries and result in obstruction of blood to the heart. CAD is the largest cause of death for American men and women and is the leading cause of sudden cardiac arrest in America.

Almost any area of the body can be affected by cardiovascular disease (CVD), because almost the entire body is dependent on blood flow to and from the living tissues. When the disease process affects an area other than the heart, it is called peripheral vascular disease. The second largest form of CVD and the largest peripheral vascular disease is stroke; this is a disease process that restricts blood flow to the brain. Restriction of blood flow to the brain that is prolonged and causes death of tissue is often called a cerebral vascular accident or a stroke. It is similar to a heart attack, which is caused by a significant obstruction of blood flow to the heart and where tissue death occurs. Figure 2 represents all types of CVD in Arizona. Clearly, the largest cause of CVD deaths is ischemic heart disease.



## Estimated Prevalence of Cardiovascular Disease in Arizona

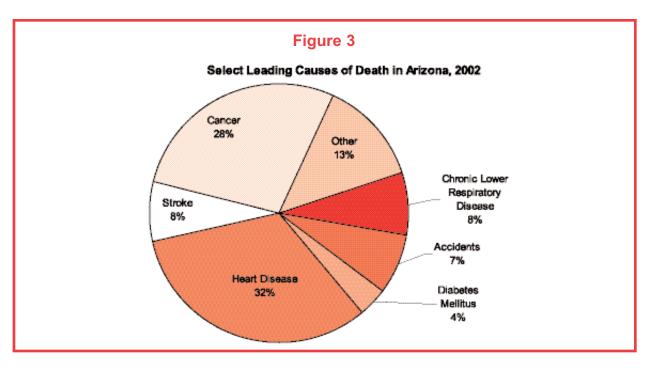
The CDC and the American Heart Association (AHA) have estimated that nearly 61 million Americans have at least one form of CVD. CAD has the largest prevalence in America, with 12 million people diagnosed. The other component of CVD is stroke, which is estimated to have a prevalence of nearly 4 million Americans.

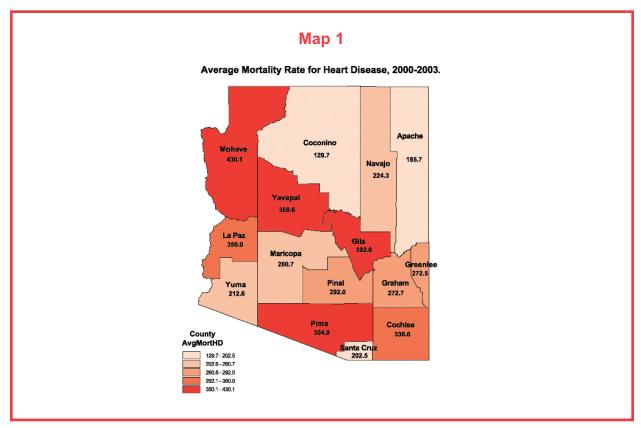
The prevalence of CVD in Arizona is difficult to estimate, due to a lack of available data. In order to calculate the rate, it is necessary to rely on existing surveys such as the Behavioral Risk Factor Surveillance Survey (BRFSS), a telephone survey that is administered nationally on an annual basis, or the National Health Interview Survey (NHIS), the most recent of which was completed in 2001. The rates, unless otherwise stated, reflect individuals age 20 years and older. Based on the NHIS, the prevalence of heart diseases in Arizona was estimated to be 4,195 per 100,000 people and the prevalence of stroke in Arizona was estimated to be 2,457 per 100,000 people.

# Cardiovascular Disease Mortality in Arizona

While disease prevalence is very important in determining where prevention programs should be located, the most accurate data for CVD prevalence is mortality data. CVD is the leading cause of death, both nationally and in Arizona. Nearly 950,000 Americans die from CVD each year, and CVD accounted for 40 percent of the deaths in Arizona in 2002. Figure 3 shows the leading causes of death in Arizona. The top four leading causes of death in Arizona are heart disease, cancer, stroke, and chronic lower respiratory disease.

Arizona ranked 42<sup>nd</sup> in the U.S. and the District of Columbia in deaths due to diseases of the heart, with an age adjusted rate of 204.5 per 100,000 population in 2001. Arizona ranked 46<sup>th</sup> across the U.S. and the District of Columbia in deaths due to stroke with an age adjusted rate of 48.2 per 100,000 population.





Morbidity and Mortality from CVD are related to a number of modifiable risk factors, and many experts view CVD as largely preventable. Many of these risk factors can be addressed by interventions aimed at improving unhealthy behaviors, such as a sedentary lifestyle, cigarette smoking, and poor dietary habits. Risk factors like tobacco use, physical inactivity and poor nutrition not only increase the likelihood of developing CVD, they also lead to high blood pressure and high cholesterol. These conditions are also risk factors for developing heart disease and stroke. As shown in Figure 1 each additional risk factor exponentially increases the risk of developing and dying from heart disease and stroke. Therefore, by reducing the occurrence of the modifiable risk factors that are responsible for CVD, it is possible to reduce the death and disability from CVD in Arizona.

# County Burden of Cardiovascular Disease in Arizona

The following maps of Arizona show where CVD rates are highest and services should be concentrated. There are 15 counties in Arizona, and two primary population centers within those counties. The counties are: Apache, Coconino, Cochise, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, and Yuma. The population centers are Phoenix, located in Maricopa County, with an estimated population of 3,389,260,<sup>13</sup> and Tucson, located in Pima County, with a population of 892,798. The average mortality rate (2000-2003) in Arizona for heart disease is shown in Map 1. The counties with the highest mortality rate are Gila, Mohave, and Yavapai. These three counties have mortality rates from heart disease of 392.0, 430.1 and 368.6 per 100,000 population, respectively. 15

Apache, Coconino and Santa Cruz counties have the lowest rate mortality from heart disease, with rates of 185.7, 129.7, and 202.5 per 100,000 respectively. Maricopa County and Pima County have moderate rates of mortality as a result of heart disease, compared to the other counties in Arizona.

Map 2 shows the average mortality rate across Arizona for stroke. Between 2000 and 2003, Gila and Yavapai counties have the highest rate of mortality due to stroke with rates of 92.9 and 108.5 per 100,000 respectively. The lowest mortality rates during the same time period occurred in Apache and Coconino counties with rates of 35.9 and 35.0 per 100,000 population, respectively. Maricopa County had a slightly lower rate at 60.8 per 100,000 population than Pima County with a rate of 74.6 per 100,000

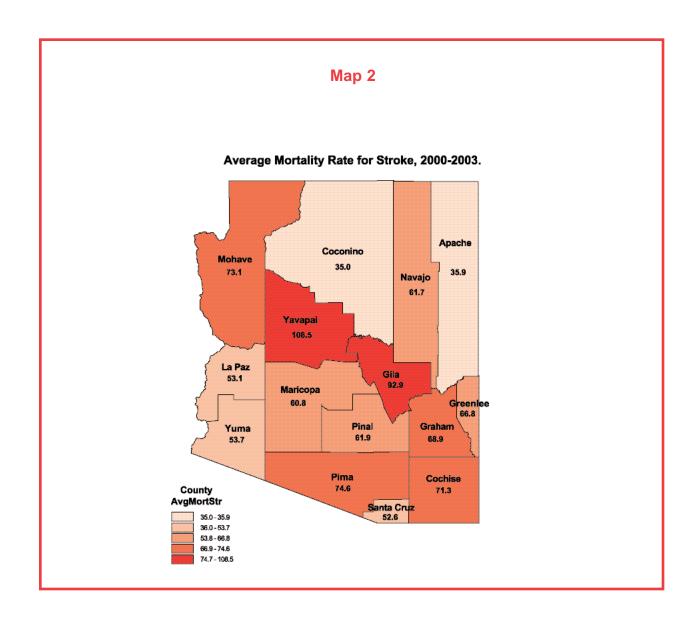


Table 1

Annualized Count of Hospitalizations in Non-Federal Hospitals 2000-2003

County	Heart Disease Hospitalizations	Stroke Hospitalizations
Apache	671.9	132.7
Cochise	1969.7	310.9
Coconino	1025.8	199.8
Gila	2308.8	489.8
Graham	1761.9	292.3
Greenlee	1324.3	317.4
La Paz	1908.3	443.2
Maricopa	1464.6	379.1
Mohave	2275.1	489.6
Navajo	1241.9	293.4
Pima	1663.5	385.5
Pinal	2307.9	447.5
Santa Cruz	1608.9	366
Yavapai	1990.9	484
Yuma	1802.7	408

Table 1 shows the average count of hospitalizations in non-federal hospitals across Arizona for heart disease and stroke. It is interesting to note that the northeast counties in Arizona all have low counts for heart disease and stroke hospitalizations. One theory is that the data used only captures hospitalizations in non-federal facilities. Therefore, information regarding

hospitalizations at Indian Health Services (IHS) facilities and Veterans Affairs (VA) hospitals would not be included in these numbers. In order to more accurately portray the CVD hospitalization rate in the northwest counties of Arizona, it would be necessary to have access to that information.

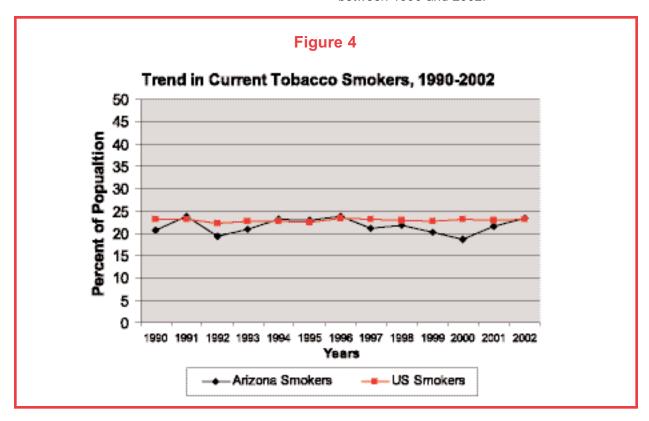


#### **Modifiable Risk Factor Analysis**

#### **Smoking**

Cigarette smoking has significant evidence linking it to an increased risk of developing CVD. People who smoke have a 70 percent increased risk of developing CVD than a non-smoker. The length of time a person smokes or how deeply they inhale will also affect their risk of developing CVD.

Arizona ranks 23<sup>rd</sup> across the U.S. with 23 percent of adults reporting current cigarette smoking in the 2002 BRFSS. According to the 2002 BRFSS 20 percent of females and 26.9 percent of men report that they are currently smoking. Figure 4 shows the trend for smoking among adults in Arizona between 1990 and 2002.



#### **Physical Inactivity**

Due to recent health marketing campaigns, the public is aware that there are positive benefits from physical activity (PA), such as weight loss, improved energy and alertness. PA, especially aerobic exercise, plays a significant role in the prevention of heart and blood vessel disease and reduces the risk of developing CVD. However, the general public is unaware that lack of PA is causal in developing CVD. Bluntly put, physical inactivity is as bad for you as high cholesterol, high blood pressure and smoking.

The intensity of the activity significantly contributes to a reduction in risk. Additionally, PA improves the likelihood of surviving a heart attack.

In the U.S. approximately 250,000 deaths per year are attributable to lack of physical activity. PA prevents and helps treat many established atherosclerotic risk factors, including elevated blood pressure, insulin resistance and glucose intolerance, elevated triglyceride concentrations, low and high-density lipoprotein cholesterol concentrations, and obesity.

According to the BRFSS, Arizona ranks 32<sup>nd</sup> across the U.S. with 22.6 percent of adults reporting no leisure time activity. Figure 5 shows the trend in Arizona and the U.S. No data was collected in 1993, 1995, 1997 and 1999.

During the late 1990s there was a sharp increase in the percent of adults who engaged in no leisure time physical activity. However, since 1998, that trend has decreased. In 2002, 22.6 percent of Arizonans reported that they were sedentary. Given the number of health problems that can be encountered with sedentary habits, it is an encouraging trend to see that more people are being physically active.

#### **High Cholesterol**

Cholesterol is a soft, fat-like, waxy substance found in the bloodstream and in all body cells. 

Cholesterol is essential for human life and is

synthesized in adequate amounts by the liver. Although it is essential for human life, cholesterol is not an essential component of the typical American's diet. Cholesterol is used to produce cell membranes, some hormones, as well as participate in other crucial body functions. Cholesterol is obtained in two ways: 1) it is made by the liver; and 2) it comes from animal products such as beef, poultry, eggs, fish, butter, cheese and milk. Foods such as fruits and vegetables do not have cholesterol in them. Individuals with high cholesterol levels often have high levels of cholesterol synthesized by the liver or a high dietary cholesterol intake. It is important to know that saturated fat in the diet has a more profound effect on blood cholesterol levels than cholesterol in the diet. It is thought that high dietary intake of saturated fat signals the liver to increase cholesterol production and may adversely affect the type of cholesterol synthesized by the liver.

Figure 5 Prevalence of Sedentary Lifestyle, Arizona and United States, 1990 - 2002 60 Percent of Population 50 40 30 20 10 0 2002 1990 1991 1992 1994 2000 2001 -Arizona Sedentary ---US Sedentary

Therefore, decreasing dietary saturated fat intake may more substantially lower total cholesterol than decreasing dietary cholesterol intake. A common strategy to lower saturated fat intake is to move to a more plant-based diet, which reduces both saturated fat and cholesterol levels in the diet.

There are two forms of cholesterol in the blood. High-density lipoprotein cholesterol (HDL) is considered "good" or protective cholesterol. It helps to extract excess cholesterol from blood vessel walls and transport it back to the liver for elimination through the gastrointestinal tract. Current guidelines recommend that HDL cholesterol levels in the blood be above 40mg/dL for men and 50mg/dL for women. Because fat and cholesterol do not dissolve into the blood, they must be carried through the body with lipoproteins. Studies have shown that for every 1-mg/dL rise in HDL cholesterol, the risk of developing CVD decreases by two to three percent.

Low-density lipoprotein cholesterol (LDL) is the other form of cholesterol in the blood and is commonly referred to as "bad" cholesterol. LDL cholesterol collects inside the walls of arteries and contributes to the formation of plaque. Current guidelines recommend an LDL cholesterol level of no more than 100mg/dL. The risk of developing CVD increases exponentially as LDL levels rise. Additionally, even in a patient with a well controlled LDL cholesterol level below 100mg/dL, if HDL cholesterol levels are lower than the recommended 40mg/dL risk of developing heart disease or stroke increases.

Triglycerides are fatty substances found both in blood and adipose tissue in the body. They are also a component of LDL cholesterol. They are present in both plasma and form the plasma lipids, in relation to cholesterol. Triglycerides can be derived from other food sources such as carbohydrates and protein. Calories that are not turned into energy immediately are turned into triglycerides and transported to fat cells to be stored. They are released from fat cells and used for energy between meals. They are also a risk factor for CVD. Current guidelines indicate that triglyceride levels should not exceed 150mg/dL.22 An estimated 105 million Americans have a total cholesterol level of 200mg/dl or higher, and over 80 percent of those with high cholesterol do not have it under control. Nearly 37 million Americans have cholesterol levels of 240mg/dL or above. 24 In 2003, 34.6 percent of Arizonans were at risk of having high cholesterol. 25

Individuals with increased risk of high cholesterol are encouraged to begin therapeutic lifestyle changes (TLC). These changes include following the TLC diet, a low saturated fat, low cholesterol diet, engaging in physical activity, and managing weight. The TLC diet recommends that saturated fat make up less than seven percent of total caloric intake, and cholesterol intake is less than 200 milligrams per day. It also recommends that an intake of 10 to 25 grams per day of soluble fiber and an intake of two grams per day of plant stanols/sterols. If, after three months of TLC, LDL cholesterol is still not within the desired range, drug therapy with statins might be considered in combination with TLC.



#### **High Blood Pressure**

Blood pressure below 120/80 mmHg is necessary for efficient functioning of the cardiovascular system. 27 When the heart beats (a state called systole), it pumps blood through the body and creates increased pressure in the arterial system. This rise in pressure when measured at its peak is therefore called systolic blood pressure. This pressure in the arteries is the result of two different forces. The first force occurs as the blood pumps through the arteries and circulatory system. The second force occurs as the arteries resist the flow of the blood. The arteries of a healthy person are elastic and muscular and stretch as the blood flows through them. Blood pressure rises as the heart beats and decreases as the heart relaxes between beats (a state called diastole). Blood pressure can change from minute to minute and can increase or decrease as a natural response to changes in posture, stress, exercise, or many other factors.

For example, systolic blood pressure can increase two-fold in response to extreme stress such as However, the blood pressure of a healthy adult should not remain elevated chronically. The newest recommendations from the National Heart, Lung, and Blood Institute (NHLBI) states that the blood pressure of typical adults should be below 120/80 mmHg. 28 pressure that consistently stays between 121-139/81-89 mmHg is considered to be pre-hypertension, a condition that often leads to high blood pressure, and blood pressure above 140/90 mmHg is considered to be hypertension or high blood pressure. The purpose of the new "pre-hypertensive" category is to increase the understanding of dose-response relationship between CVD risk and elevated blood pressure.

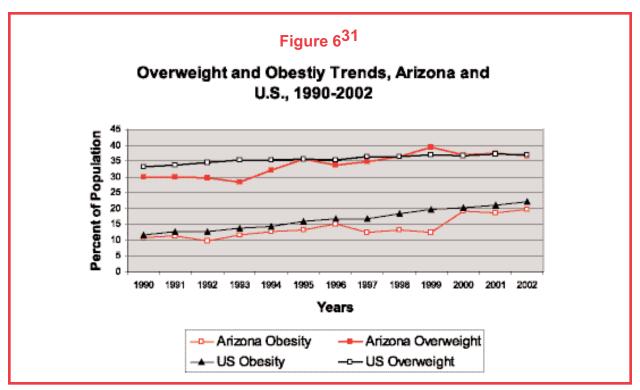
It is now recommended that individuals who have been classified as pre-hypertensive by three consecutive measurements should begin the intervention to lower blood pressure to acceptable levels prior to becoming truly hypertensive.

Major lifestyle modification is required for those who have high blood pressure and are good guidelines to reduce risk of developing high blood pressure. These modifications include weight reduction in those individuals who are overweight or obese, following the Dietary Approaches to Stop Hypertension (DASH) diet, increased physical activity and moderation of alcohol consumption. These lifestyle modifications can reduce blood pressure, increase drug therapies, and decrease CVD risk. Additionally, combining two or more of these modifications can achieve even better results in decreasing blood pressure.

High blood pressure is often called the "silent killer" because a person can have it for years without showing any signs or symptoms. In primary or essential hypertension, which accounts for 90-95 percent of the cases of high blood pressure, the cause is unknown. The leading cause of non-essential hypertension is renal artery stenosis. Renal artery stenosis occurs when atherosclerotic lesions restrict the blood supply to the kidneys from the renal artery.

This may cause hypertension, electrolyte abnormalities that can lead to life-threatening arrhythmia, and in cases of extreme stenosis, cause ischemia leading to kidney failure and necrosis or infarct. The heart, brain, and kidneys can adapt to high blood pressure for long periods of time, which is why people can live so long with the disease and not display any symptoms. However, these adaptations can cause long-term complications, such as problems with the heart valves, cardiomyopathy or cardiomegaly, which can cause CHF or even a stroke.

Nearly 65 million Americans have high blood pressure and another 45 million Americans are pre-hypertensive. Further, 70 percent of people with high blood pressure do not have it under control through medications, diet modifications, or exercise. Even a reduction of 12-13 mmHg in blood pressure in those with hypertension can result in a reduction of heart attacks by 21 percent, strokes by 37 percent, and total CVD deaths by 25 percent.20 In Arizona, 23.6 percent of Arizonans have been diagnosed by a physician as having hypertension, an increase from 14.2 percent in 1999. This is far above the Healthy People 2010 goal of 16 percent or less reporting doctordiagnosed hypertension and only slightly below the national average of 27.4 percent. Arizona ranks 40<sup>th</sup> across the U.S. and the District of Columbia for cases of high blood pressure.<sup>30</sup>



#### Obesity

Arizona, like the rest of the U.S., is seeing an alarming increase in the rate of obesity. In 1991, 11 percent of the Arizona population was considered obese; however by 2000, this had increased to 18 percent of the state. The 2003 BRFSS indicated that nearly 57.1 percent of the Arizona population is considered overweight or obese.<sup>31</sup> In 2002, 54.8 percent of deaths in Arizona were from diseases for which overweight and obesity are known to increase the risk. Overweight and obesity in Arizona is not just affecting adults. According to the Pediatric Nutrition Surveillance System 24 percent of low-income children between the ages of two and five years old are overweight or at risk of becoming overweight. In 2003, the Youth Risk Behavioral Surveillance System indicated that 24 percent of Arizona high school students are overweight or at risk of becoming overweight.

Figure 6 shows the increasing prevalence of obesity and overweight in Arizona and the U.S. Health experts warn that if this trend in obesity and overweight does not change, eventually the entire population of the U.S. will be either overweight or obese.

Obesity and overweight increase the risk of developing many chronic health problems, including CVD. There are two ways of measuring overweight and obesity, Body Mass Index (BMI) and waist circumference. BMI is calculated using weight and height and is used because, for most people, it correlates with their amount of body fat. A person is considered to be overweight if they have a Body Mass Index (BMI) between 25.0kg/m<sup>2</sup> and 29.9kg/m<sup>2</sup> and is considered to be obese if they have a BMI of 30kg/m<sup>2</sup> or greater.<sup>32</sup> Although a BMI of 24.9kg/m<sup>2</sup> does not meet the definition of overweight, there is still an increased risk of developing CVD. In Arizona, according to the 2003 BRFSS, 20.1 percent of the respondents either met or exceeded the BMI for obesity and 37 percent of the respondents were overweight.

One limitation of using BMI to determine overweight and obesity is that it does not directly measure body fat. Some people, like athletes, may have a BMI that identifies them as overweight even though they do not have any excess body fat. Another factor to consider in determining obesity is waist circumference. According to the American Dietetic Association, a waist circumference of 40 inches in men and 35 inches in women is a good indicator of increased risk of CVD and other chronic conditions. Excess abdominal fat increases the risk of high blood pressure and high cholesterol, both risk factors for developing CVD. Recent studies indicate such fat is also a strong indicator of type 2 diabetes risks. 33 BMI does not specifically indicate where fat is distributed and persons with increased abdominal (visceral) fat are at particular risk of CVD because the fat is around their major internal organs. Visceral fat also secretes more inflammatory agents that may rupture plaques in arteries, leading to heart attack or stroke. Currently, Arizona does not have waist circumference data available.

Not only does obesity and overweight have a significant physical impact, the increased economic costs have a considerable impact on the

U.S. healthcare system. The national costs of overweight and obesity accounted for 9.1 percent of the total U.S. medical expenditures in 1998 and may have reached as high as \$92.6 billion in 2002. In Arizona, between 1998 and 2000, the estimated costs of obesity and overweight were \$752 million.

In addition to the medical costs that can be attributed to obesity and overweight, it is important to consider other economic costs incurred through activities such as dieting. Many individuals who are overweight or obese use diets to try and bring their weight down to a healthy level. However, often times these are popular diet trends and may work in the short term, but generally do not emphasize the behavior changes required to maintain a healthy weight. Nationally, 55 million Americans attempt some kind of diet plan each year, and only 5-10 percent of those achieve their goal. Across the U.S., \$40 billion is spent in the weight loss industry, and by 2006 this amount is expected to top \$48 billion annually. Many popular diet trends promise a quick solution but do not emphasize that in order to lose weight, caloric intake needs to decrease and energy expenditure needs to increase.

#### **Diabetes**

Diabetes Mellitus (DM) was once considered a contributing risk factor for cardiovascular disease, but recent data has indicated that diabetes is a independent risk factor for CVD and the American Heart Association has designated diabetes as a major modifiable risk factor for heart disease and stroke. The National Cholesterol Education Program has declared that a person with diabetes is to be treated like they have CVD as well.

For many, the relationship between CVD and DM likely begins in the "pre-diabetic state" sometimes referred to as metabolic syndrome. This syndrome is characterized primarily by abdominal fat, low-levels of HDL, high levels of triglycerides and high blood pressure. Secondary characteristics include elevated liver enzymes and hyperinsulinemia. One third to one half of the people with metabolic syndrome will eventually develop diabetes, but cardiovascular disease can occur prior to diabetes due to the presence of high blood lipids and the other risk factors present. Men with metabolic syndrome have four times the risk of developing fatal CAD and two times the risk of developing any kind of CVD, even after adjustments for age, LDL-cholesterol, smoking and family history.

Those with metabolic syndrome have five to nine times the risk of developing diabetes, which increases the risk of dying from CVD by two to four times. CVD is the major cause of morbidity in patients with diabetes and outcomes for patients with both DM and CVD are far worse than those with only CVD and no DM present. According to the AHA diabetes committee, nearly two-thirds of people with DM will eventually die of heart or blood vessel disease. It is important to keep DM in mind as a risk factor for CVD in Arizona given the high

prevalence of DM in the Native American populations and the large numbers of this group in Arizona.

#### **Nutrition**

Even though there is still more to learn about the role specific nutrients or combinations of nutrients play in chronic diseases, dietary patterns are an important consideration in reducing the risk of developing CVD. The DASH diet, which emphasizes increased consumption of fruits and vegetables, and low-fat food has been shown more effective than sodium restriction alone to reduce high blood pressure, a leading cause of CVD. Consumption of lean meats, including limiting red meat, and emphasis on low-fat dairy products is also an important step in reducing CVD risk by reducing fat intake. A heart healthy diet is recommended for all people, not just those with diagnosed heart disease. A heart healthy diet is described as limited saturated fat intake (less than 10 percent of total daily calories), limited cholesterol intake (less than 300 mg/dL), and limited intake of trans-fatty acids combined with the consumption of fruit and vegetables as mentioned above.

Current dietary guidelines emphasize eating fruits and vegetables and keeping fat intake between 20 and 35 percent of total daily caloric intake. The Dietary Guidelines are reviewed and updated every five years in a joint effort by the U.S. Department of Health and Human Services (DHHS) and the U.S. Department of Agriculture (USDA). These two organizations identified the need to emphasize energy balance, the consequences of a sedentary lifestyle, and certain food choices in the sixth edition of the Dietary Guidelines.

The key recommendations in the 2005 Dietary Guidelines are:

- Consume a variety of nutrient dense foods and beverages within and among the basic food groups while choosing foods that limit the intake of saturated and *trans* fats, cholesterol, added sugars, salt and alcohol.
- Meet recommended intakes within energy needs by adopting a balanced eating pattern, such as the USDA Food Guide or the DASH Eating Plan.
- To maintain body weight in a healthy range, balance calories from foods and beverages with calories expended.
- To prevent gradual weight gain over time, make small decreases in food and beverage calories and increase physical activity.
- Engage in regular physical activity and reduce sedentary activities to promote health, psychological well-being and a healthy body weight.

- Achieve physical fitness by including cardiovascular conditioning, stretching exercises for flexibility and resistance exercise or calisthenics for muscle strength and endurance.
- Consume a sufficient amount of fruits and vegetables while staying within energy needs. Two cups of fruit and 2½ cups of vegetables per day are recommended for a reference 2,000-calorie intake, with higher or lower amounts depending on the calorie level.
- Choose a variety of fruits and vegetables each day. In particular, select from all five vegetable subgroups (dark green, orange, legumes, starchy vegetables, and other vegetables) several times a week.
- Consume 3 or more ounce-equivalents of whole-grain products per day, with the rest of the recommended grains coming from enriched or whole-grain products. In general, at least half the grains should come from whole grains.



- Consume 3 cups per day of fat-free or low-fat milk or equivalent milk products.
- Consume less than 10 percent of calories from saturated fatty acids and less than 300 mg/day of cholesterol, and keep *trans* fatty acid consumption as low as possible.
- Keep total fat intake between 20 to 35
  percent of calories, with most fats coming
  from sources of polyunsaturated and
  monounsaturated fatty acids, such as fish,
  nuts, and vegetable oils.
- When selecting and preparing meat, poultry, dry beans, and milk or milk products, make choices that are lean, low fat, or fat-free.
- Limit intake of fats and oils high in saturated and/or trans fatty acids, and choose products low in such fats and oils.

Americans are encouraged to get the energy they need while maintaining a healthy weight and being physically active at least 30 minutes a day, most days of the week. Alcohol, for those who drink, is recommended in moderation only; no more than 2 drinks per day for men and 1 drink per day for women. A consumer friendly resource with more details can be found at <a href="http://www.mypyramid.gov">http://www.mypyramid.gov</a>.

Those with diagnosed CVD should seek Medical Nutrition Therapy (MNT) from a registered dietitian. Based in the individual's particular size, food preferences, available food, and other factors the MNT may include vitamins, supplements, changes in cooking styles, guidance for eating outside the home, and access to additional food resources. A dietary prescription and behavior modification programs are key to reducing the damage and disability that can result from CVD. Communities that provide a variety of healthy food choices and opportunities for physical activities in safe and convenient environments are essential for preventing CVD and making the lifestyle modifications for those at risk possible.



#### Non-modifiable Risk Factor Analysis

#### Age

Many risk factors for developing CVD can be modified by various interventions. However, four risk factors cannot be affected by any kind of interventions. Age is a risk factor for cardiovascular disease because, generally, atherosclerotic lesions are the result of a progressive process that develops over years. As a person ages, their aortic system stiffens, thus increasing the blood pressure and risk for a cardiac event. 47 According to the NHLBI, approximately 72 percent of the people who suffer a stroke are age 65 years and older and the incidence of stroke more than doubles in each successive decade after the age of 55. In Arizona, the mortality rate for stroke and heart disease were higher in the older age group of 65 years and older. This data is most useful in interpreting signs and symptoms of diagnostic test data in those age 40 years or older. Recent studies of children show the beginnings of the streaky patterns in the inner lining of the artery. This indicates that prevention of MI and stroke in adults in their 6<sup>th</sup> and 7<sup>th</sup> decade of life may begin in their childhood. Preventing the beginning injury to the arterial wall would have the most profound effect of reducing cardiovascular diseases.

Risk factors such as smoking status, physical activity level, cholesterol values, blood pressure and level and distribution of adiposity can have a profound effect on the rate of progression of CVD once arterial insult has occurred. In extreme cases of risk factor modification, atherosclerotic lesions can be held stagnant and in some cases, even reversed. By controlling risk factors as a person ages, the risk of death or disability from CVD declines.

#### Gender

Gender is an important non-modifiable risk factor for the development of cardiovascular disease. However, heart disease and stroke are still the number one cause of death among men and women. In Arizona, the age adjusted mortality rate for heart disease in 2003 for males was 246.6 per 100,000 population and 157.1 per 100,000 population for females. The age adjusted mortality rate for stroke in males was 42.9 per 100,000 population and 43.8 per 100,000 for females. This shows that men are more likely to die from heart disease, while women are more likely to die from a stroke.

Death and disability associated with cardiovascular disease can be reduced significantly by increasing the awareness that women develop CVD. During a study conducted in 1997 by the American Heart Association, more than 50 percent of the women interviewed felt that cancer was a greater threat to them than cardiovascular disease. However, women are twice as likely to die within a year of having a heart attack. This is due partly to not recognizing the signs and symptoms of a heart attack and assuming that they exhibit the same behaviors as men do when they are having a heart attack. The American Academy of Cardiologists (AAC) and the AHA released a position paper regarding the acute treatment of atypical symptoms that may indicate that an acute coronary episode is happening. When compared to the typical symptoms a man might have, women seem to complain more of gastro intestinal symptoms. Complaints of this nature may lead the patient and/or the clinician to consider less lethal conditions.

Additionally, women take longer to present to the Emergency Room with symptoms, not only because of the atypical symptoms that they present with but possibly due to a higher threshold of pain. Once at the hospital, many of the diagnostic procedures used are not as accurate for women or they require specialized knowledge on how to modify the interpretation for a woman. Women also tend to delay treatment in order to complete other tasks.

A broad-based intervention is necessary in Arizona to reduce the death and disability associated with CVD in women by increasing the awareness that CVD is the number one medical threat to their lives. Public awareness of the signs and symptoms of a heart attack in both men and women and the need to seek immediate medical attention is a crucial element of reducing death and disability from CVD in Arizona.

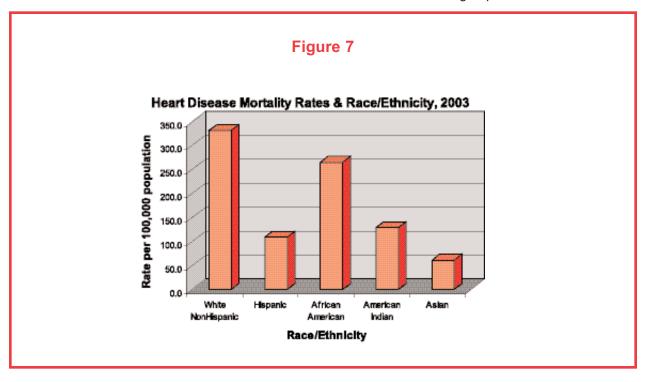
#### Heredity

The third non-modifiable risk factor for CVD is heredity. Individuals who have a family history of CVD are likely to develop it themselves.

However, while the individual may not be able to change the fact that they make higher levels of blood cholesterol, they can mitigate the effect of their high cholesterol with comprehensive lifestyle modifications.

#### Race

Nationally, cardiovascular disease is the leading cause of death and disability. When looking at the heart disease component of CVD using a racial and ethnic breakdown, heart disease is the leading cause of death for American Indians and Alaska Natives, African Americans, Hispanics and White, Non-Hispanics. Cancer is the leading cause of death for Asians and Pacific Islanders, accounting for 26.4 percent of all deaths, with heart disease accounting for 25.4 percent of all deaths.51 highest mortality rate for heart disease nationally, among racial and ethnic groups is among White, Non-Hispanics, at 263 per 100,000 population and African Americans have the second highest mortality rate for heart disease at 210 per 100,000 population. Figure 7 shows a comparison of mortality rates for heart disease in Arizona among the racial and ethnic groups.



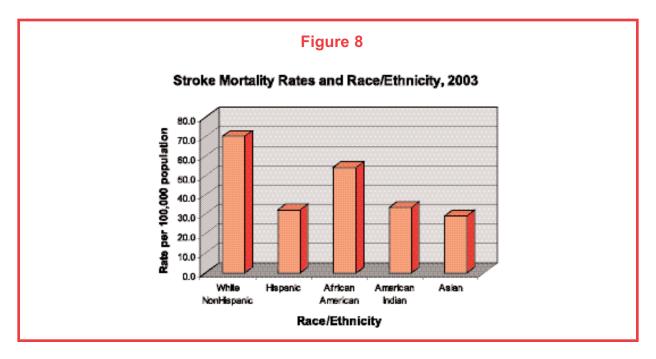


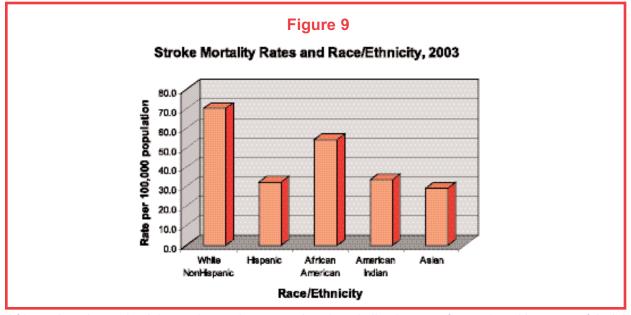
Figure 8 shows the hospitalization rates for heart disease in Arizona. Heart disease was projected to cost the U.S. \$238.6 billion, nationwide, in medication, health care services and lost productivity.

The highest rate of hospitalizations in Arizona was for White Non-Hispanics at 1601.1 per 100,000 population in 2003. The second highest rate of hospitalizations was among African Americans at 1480.7 per 100,000. The lowest rate of hospitalizations occurred in Asians, at 279.6 per 100,000 population, significantly lower than that of White Non-Hispanics and African Americans. The hospitalization rate for Native Americas in Figure 8 is likely artificially low because the state database for hospitalizations does not capture events at Indian Health Service facilities.

The other component of CVD addressed in this plan is stroke, and independent of heart disease,it is the 3<sup>rd</sup> leading cause of death in the U.S. and accounted for about one out of every 14 deaths in the U.S. in 2000. Stroke mortality rates are substantially higher for African Americans than for White, Non-Hispanics with rates of 87 per 100,000 population of African American males versus 59 per 100,000 for White Non-Hispanic males and 78 per 100,000 population of African American women versus 58 per 100,000 for White Non-Hispanic women. All other racial/ethnic groups have significantly lower mortality rates, compared to African Americans.

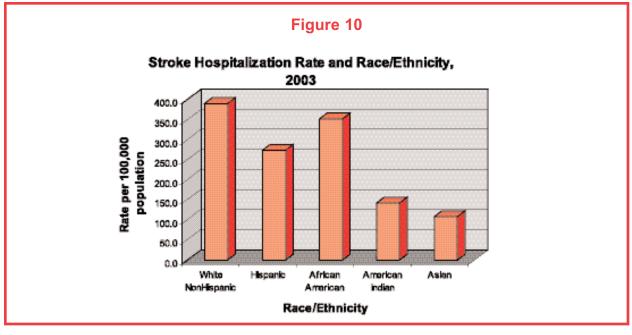
In Arizona, the highest mortality rate associated with stroke occurs in the White Non-Hispanic group, with a rate of 70.2 per 100,000 population,

contrary to the national trend. Figure 9 shows a comparison of racial and ethnic groups for stroke mortality.



African Americans in Arizona have the second highest mortality from stroke, with a rate of 54.2 per 100,000. Figure 10 compares the hospitalization rates for stroke in Arizona among the five leading racial and ethnic groups.

White, Non-Hispanics in Arizona continue to have the highest rates for hospitalization due to stroke with a rate of 390.1 per 100,000 population. African Americans have the second highest hospitalization rate for stroke with a rate of 351.6 per 100,000 population. Asians have the lowest hospitalization rates for stroke with a rate of 106.8 per 100,000 population. While there are few cost estimates for stroke, in 1998, Medicare spent \$3.6 billion on stroke survivors discharged from short-stay hospitals. This is not adjusted to reflect additional costs incurred after discharge, medications the patient is put on, or lost productivity.



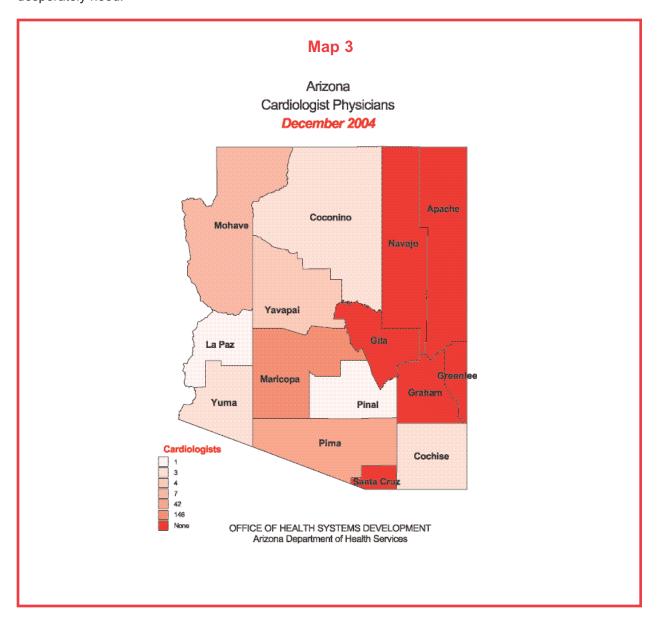
#### **Lack of Access to Care**

Many Arizona residents do not have access to the specialty care needed to treat their cardiovascular disease. According to the U.S. Census projections, the population of Arizona in 2003 was estimated to be 5,580,811. Nearly 77 percent of this population lives in either Maricopa or Pima counties, so it is understandable that physicians would want to live where the people live.

Alarmingly, that leaves 23 percent of the residents of Arizona without the specialty care that they desperately need.

There are five counties, Apache, Gila, Graham, Greenlee, and Navajo, within the state of Arizona that do not have any type of cardiologist to serve the residents. Map 3 shows the location of the cardiologists within the state of Arizona. The majority of them are concentrated in the Phoenix and Tucson metropolitan areas.

Having access to a specialty medical provider, a primary care physician, and having medical insurance are all leading indicators of health.

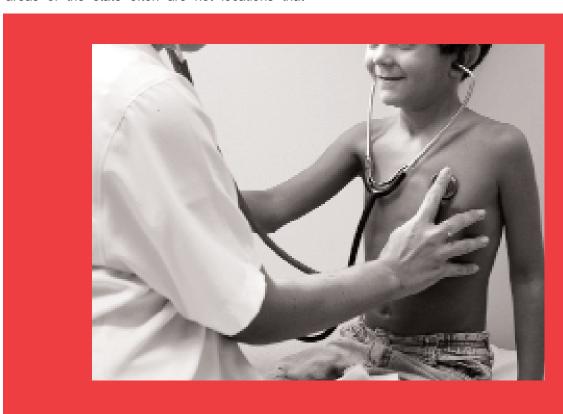


Part of the Healthy People 2010 National Objectives, as well as the Healthy Arizona 2010 Objectives, is to increase the number of persons with health insurance. According to the 2002 BRFSS, 16.1 percent of the population in Arizona did not have any form of health insurance. This is a small decrease from the 2000 BRFSS, which indicated that 17.1 percent of the population in Arizona did not have health insurance. High rates of uninsured individuals are startling, as those people tend to be less healthy and are more likely to report poor health status overall. They are also more likely to delay seeking medical care and forego medically necessary care for serious health conditions.

There are several other barriers that prevent Arizonans from seeking necessary medical care. Physical distance from care and lack of transportation are also significant barriers that are difficult to overcome. Arizona is the sixth largest landmass in the U.S., and the rural and frontier areas of the state often are not locations that

attract physicians; hence they tend to be located in the metropolitan areas. While 77 percent of the population lives in the metropolitan areas of the state, the other 23 percent of the residents live in very rural locations, sometimes many hundreds of miles away from the nearest specialist. As a result of living far away from the nearest provider, it is quite possible for a person suffering from a stroke or heart attack to miss the window of opportunity for effective treatment, thereby significantly worsening their chances for a survival or reduced disability. Transportation protocols for emergency services (ambulances) and use of technologies, like telemedicine, are imperative in a state with as much distance between rural areas and metropolitan areas as is found in Arizona.

The Arizona State Plan to address heart disease and stroke focuses on secondary prevention in adults age 20 years and older but not to the exclusion of primary prevention and other age groups.



#### **Objectives**

This is the target population for two reasons:

- Many of the programs aimed at children, (e.g. smoking prevention and cessation, removing foods with minimal nutritional value from vending machines in schools, encouraging physical activity in schools and during leisure time) are currently being implemented by other programs within and outside the Arizona Department of Health Services. In an effort to ensure that consistent messages are being used and to reduce duplication, the state plan for heart disease and stroke does not focus on this age group, but does support efforts being done by other entities.
- Secondary prevention is the focus of this plan because there are many existing primary preventions that impact more than one chronic disease. For example, a portion control campaign would emphasize

reducing the amount of food a person is eating. By doing this, the individual might lose weight, thus addressing the obesity epidemic, may reduce the risk of developing type 2 diabetes mellitus, and reduce the risk of developing heart disease and stroke. In an effort to maximize existing resources and avoid duplication, especially in light of limited resources in heart disease and stroke prevention efforts, we focused on interventions that are specifically aimed at heart disease and stroke and hope to capitalize on other initiatives to address primary prevention of CVD.

During the development of the state plan to reduce heart disease and stroke, the team has used the socio-ecological model to base interventions upon. These strategies will be implemented using population-based approaches.



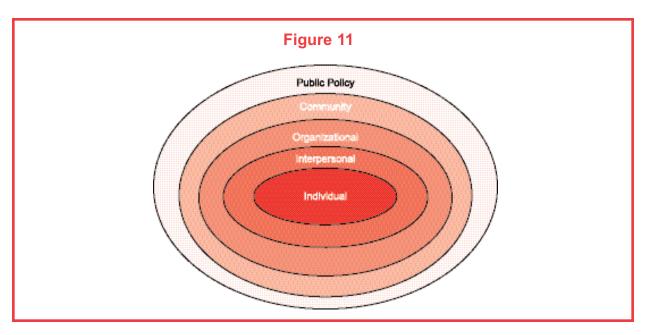
Behavior can be influenced at multiple levels: individuals, interpersonal, organization, community and public policy. This model was chosen as the basis for the objectives because it combines individual behavior with social and physical environments. Figure 11 depicts the interrelationships between the various levels of the socio-ecological model.

The strategies that are suggested in this plan recognize that individuals have the responsibility for self-regulation of their behaviors to achieve positive changes. However, it also recognizes the influence of outside environmental forces such as worksites, schools, and community organizations to promote and maintain healthy lifestyles.

A major portion of this plan will focus on changes within the healthcare system in order to improve and encourage compliance with heart disease and stroke. It will also promote awareness regarding the signs and symptoms of heart attacks and strokes.

# Cardiovascular Disease State Plan Long Term Objectives:

- Reduce the number of coronary deaths in Arizona by 25 percent, by the year 2010, in conjunction with the American Heart Association's impact goal and achieving the Healthy People 2010 goal at the same time.
- Reduce the number of stroke deaths in Arizona by 20 percent by the year 2010.
- Decrease the number of Arizonans diagnosed with Cardiovascular Disease by 20 percent by the year 2020.
- 4. Increase the proportion of adults aged 20 years and older that are aware of the early warning signs and symptoms of a heart attack and the importance of seeking immediate medical attention.
- Increase the proportion of adults who are aware of the early warning signs and symptoms of a stroke and the importance of seeking immediate medical attention.



- Establish a surveillance system to accurately identify the true burden of Cardiovascular Disease in the state of Arizona.
- 7. Establish a core team, comprised of physicians, hospital groups, public health professionals and community members, that will advise the Arizona Department of Health Services Cardiovascular Risk Reduction Program on the activities necessary to meet the long-term state plan objectives.

# Cardiovascular Disease State Plan Primary Prevention Objectives:

- Support existing efforts to improve related risk factors for cardiovascular disease.
   (Please see appendix A for a description of the programs.)
  - a. Physical Activity Efforts:
    - i. Promoting Lifetime Activity in Youths
    - ii. Walk Everyday, Live Longer Arizona(W.E.L.L. AZ)
    - iii. Active Arizona
  - b. Obesity Prevention:
    - To promote and enable the citizens of Arizona to eat smart.
    - ii. To promote and enable active lifestyles in Arizona residents.
  - c. Smoking Cessation:
    - i. Arizona Smoker's Helpline
    - ii. Media Campaigns:
      - 1. Ashes to Ashes
      - 2. Inhale Life
    - iii. Community and School Activities
  - d. Improved Nutrition:
    - i. 5-A-Day
    - ii. Arizona Nutrition Network

- Implement primary interventions that are specific to reducing the death and disability from cardiovascular disease.
  - a. Increase the number of Arizonans that know their cholesterol values.
  - Increase the number of physicians that are following the recommended guidelines for cholesterol screening and treatment.
  - Increase the number of Arizonans that know their blood pressure value.
  - d. Increase the number of physicians that are following the recommended guidelines for blood pressure screening and treatment.
  - e. Increase the number being referred to the appropriate professionals to receive medical nutrition therapy and a formal exercise prescription to treat high cholesterol and high blood pressure.
  - f. Follow the Barbershop Hypertension Screening Program as a model for identifying hypertension in African Americans and other groups as a way to reduce disparities in the screening process.
- Implement primary interventions that are specific to those who are at increased risk of developing cardiovascular disease due to other complicating diseases.

# Cardiovascular Disease State Plan Secondary Prevention Objectives:

- 1. Individual Interventions:
  - a. Increase the number of those diagnosed with heart disease and stroke that participate in cardiac rehabilitation and other formal, multidisciplinary approaches to secondary prevention of the heart disease and stroke.

- Increase the number of those diagnosed with heart disease and stroke that adhere to their prescribed medications.
- c. Increase the number of Arizonans diagnosed with hypertension who adhere to their medications, medical nutrition therapy and formal exercise program.
- d. Increase the number of Arizonans diagnosed with hyperlipidemia/ dyslipidemia who adhere to their medications, medical nutrition therapy and formal exercise prescription.

#### 2. Community Interventions:

- a. Increase the availability of automated external defibrillators (AED) in public places where Emergency Medical Service availability may be delayed.
- b. Increase the number of sites willing to participate in the American Heart Association Public Access to Defibrillators Program.
- Increase the number of communities offering heart healthy activities and programs.

#### 3. Education Interventions:

a. Increase the number of Emergency Medical Technician training programs in the state of Arizona that include a stroke training module in their curriculum.

#### 4. Healthcare:

- a. Hospitals/Healthcare Facilities:
  - Ensure that an adequate number of Primary Stroke Centers in Arizona meet the nationally recognized guidelines.
    - Have at least one Primary Stroke Center within two hours of any

- location in the state.
- Promote telemedicine and transportation agreements between rural healthcare agencies and Primary Stroke Centers in Arizona.
- ii. Increase the number of hospitals participating in the American Heart Associations program "Get With The Guidelines" CAD, Stroke and CHF programs.

#### b. Healthcare Providers:

- Increase the number of healthcare providers who are appropriately utilizing evidence-based secondary prevention guidelines for heart disease and stroke.
- ii. Increase the number of healthcare providers who are appropriately utilizing resources for lifestyle interventions including medical nutrition therapy (MNT) and allied health professionals such as registered dietitians and exercise specialists.
- iii. Increase the number of healthcare providers who refer Arizonans to congestive heart failure multidisciplinary treatment programs.
- iv. Increase the number of healthcare providers who refer Arizonans to multidisciplinary cardiac rehabilitation programs.
- v. Increase the number of healthcare providers who refer Arizonans to multidisciplinary diabetes treatment programs and who screen diabetics for cardiovascular disease and refer them to the appropriate professional.

vi. Have cultural competence training available for providers as needed.

#### c. First Responders

- Increase the number of first responders with access to defibrillation capabilities in rural locations.
- ii. Implement protocols under which paramedic/EMT units may bypass a hospital in order to transport a stroke victim to a Primary Stroke Center, thereby increasing their chance of survival and with less severe disabilities.

#### 5 Worksite:

- a. Increase employers' awareness of heart disease and stroke risk factors and the impact that heart disease and stroke have on their workforce.
- Increase awareness that wellness efforts, especially those aimed at reducing heart disease and stroke, can reduce health care insurance claims and associated costs.
  - Establish a baseline level of cardiovascular disease-related costs.
  - Provide wellness programs for employers and strategies to create a healthier work environment for their employees.
  - iii. Increase the number of employers that offer healthier food selections in vending machines and cafeterias.
  - iv. Increase the number of employers that offer screening programs for their employees and providing referrals to appropriate care.
  - v. Increase the number of employers that allow employees to engage in

- physical activity during the workday.
- vi Increase the number of employers who provide incentives to employees for engaging in healthy behaviors, especially those that would reduce sedentary lifestyles, tobacco usages, hypertension, high cholesterol and/or obesity rates.
- vii. Increase awareness of community programs that would assist employers, especially small employers, in providing employee wellness benefits/programs.

#### 6. Policy/Environmental:

- a. Pursue funding sources, both at the federal and state level to establish and provide ongoing support for a heart disease and stroke program in Arizona.
- Increase support and awareness of the Stop Stroke Act.
- c. Pursue the possibility of making cardiac rehabilitation available to those diagnosed with any form of cardiovascular disease and not waiting until they have suffered an attack.
- d. Work in conjunction with other programs to support issues such as:
  - i. Smoke-free environments
  - ii. Physical Education in schools.
  - iii. Healthier food choices available in schools.

#### 7. Social Marketing Campaigns:

- a. Increase the number of people who are aware of and can recognize the signs and symptoms of a stroke and know the next step that needs to be taken.
  - Utilize existing stroke education materials provided by the American Heart Association.

- Increase the number of people who are aware of and can recognize the signs and symptoms of a heart attack or myocardial infarction (MI).
- c. Increase the number of women who are aware of the symptoms of a heart attack, which are very different than the signs of a heart attack for men.
- d. Increase the number of people who are aware of the signs and symptoms of sudden cardiac arrest.
- e. Increase the number of Arizonans that utilize the American Heart Association's Halle Heart Center as a resource to provide prevention education programs to adults as well as children.
- f. Ensure that messages are culturally appropriate to the populations being targeted.
- g. Provide materials such as videos and brochures in physician's offices to make patients aware of cardiovascular disease and its effects.

# Cardiovascular Disease State Plan Health Disparities Objectives:

 Provide health related information that will reduce the incidence of heart disease and stroke in culturally sensitive and relevant modalities, which will reduce disparities in individual access and ability to use the current health systems. a. Utilize the resources of the American Heart Association's Cultural Health Initiatives department as well as the American Heart Association's culturally appropriate literature in relevant populations where disparities exist.

# Cardiovascular Disease State Plan Surveillance Objectives:

- Continue to utilize the Behavioral Risk Factor Surveillance Survey, including the new modules.
- Continue to utilize the data that can be obtained via existing data sources such as mortality data, hospital discharge data, and emergency room data.
- Encourage managed care organizations to develop new data systems that more accurately capture the prevalence and management of heart disease and stroke in Arizona.
- 4. Utilize and support the American Heart Associations Get With the Guidelines modules for coronary artery disease, stroke, and congestive heart failure as a surveillance tool as well as an intervention tool.

# Addressing Cardiovascular Disease Disparities in the Native American Population in Arizona

There are populations within Arizona that require unique modifications when designing interventions to reduce disease. One such population is the Native American population. Arizona has one of the largest Native American populations in the U.S., comprising approximately five percent of the population. 53 There are 21 separate sovereign Native American nations located on 24 reservations throughout Arizona. This presents unique challenges, not only because the tribes are sovereign nations subject to their own governmental structure, but also because these tribes have geographic barriers, traditions, and history that must be considered. Statewide meetings held in 2001 to determine the healthcare needs and concerns of Native Americans across the state indicated that the greatest need is for improved infrastructure, especially around data collection, while always remembering that data collected from the tribes ultimately belongs to the tribes. They indicated that not only were interventions or services needed, but infrastructure was also needed. Primarily, they wanted to be able to adapt an intervention to fit their specific needs and cultural beliefs.

Another population that presents unique challenges is the border populations. The communities located along the Southern Arizona U.S. – Mexico border serve as a gateway between the U.S. and Mexico. These communities are largely dependent on agriculture as their main economic source. The population in this area tends to have a higher poverty rate, higher numbers of under insured and uninsured, and typically have higher rates of chronic diseases. Language differences can also create barriers to medical care in these populations. Similar to the Native American needs, the populations in the border communities need infrastructure building to successfully implement programs to combat CVD.

In order to effectively address CVD among the disparate populations in Arizona, it will be important to include them in the planning process and to develop interventions with their input so they will be more likely to be implemented. Additionally, traditional techniques that are unique to each population are very important and should be included in program planning. Ideally members need to be present during the planning process as well as be a part of the implementation team. By partnering with each population, it will be possible to develop interventions that are culturally appropriate and more effective than they would have been without community input.

## **Implementation Plan**

The development of this plan was intended to provide guidelines for organizations to use when choosing an area in the state of Arizona to conduct CVD interventions. A CVD coalition will be formed to guide interventions in the state of Arizona and will consist of public health agencies, both at the state and county level, community leaders, tribal representatives, non-profit organizations,

professional providers groups and interested stakeholders. The coalition will make recommendations on where interventions are needed and what interventions would best suit that populations needs. While funding will be pursued both at the federal level and the state level, many of the objectives in this plan can only be achieved by coordinated efforts of interested stakeholders.



## **Next Steps**

Cardiovascular disease is the leading cause of death in the U.S. and in Arizona. It is also one of the most preventable chronic diseases. Modifiable risk factors, namely tobacco use, physical inactivity, high cholesterol, high blood pressure, overweight and obesity, diabetes, and poor nutrition, are most effectively addressed through primary and secondary interventions. This plan serves as a guide for reaching the state objectives and the Healthy People 2010 objectives in Arizona. This plan can be used to guide the actions and

interventions developed not only in the state and local health departments, but also in the communities and organizations that conduct activities in and around cardiovascular disease. The objectives set down in this plan are not mandates; they are simply guides for where the most benefit could be gained from interventions. Through collaboration and partnership between organizations, a larger impact can be made and death and disability from cardiovascular disease can be reduced.



## **Appendix A**

#### **Promoting Lifetime Activity in Youths**

A 12-week teacher directed, behavior change program reaching 160 schools, 24,000 students, 8,200 parents and 900 teachers. The program was developed with consultation from the County Health Department program staff and Arizona State University (ASU) faculty. Promoting Lifetime Activity In Youths is targeted to grades four through eight and is designed to intervene when the decline in adolescent physical activity first begins. Evaluation data from the first 5 years of Promoting Lifetime Activity In Youths indicated that the attitudes of students participating in the program are more positive about physical activity and the number of students reporting that they are not physically active has decreased.

#### Walk Everyday, Live Longer Arizona (W.E.L.L. AZ)

The WELL AZ program is a physical activity program for adults who would like to increase their daily physical activity. A pedometer is used in WELL AZ as a motivation and feedback tool for participants. WELL AZ is designed to be delivered by a single facilitator. The program is four weeks long and consists of facilitated group meetings once a week combined with individual goal setting and self-monitoring, using the pedometer for feedback. Participants are to set a goal and monitor their activity using the pedometer.

#### **Active Arizona**

In 2000, Active Arizona (a statewide working group of Healthy Arizona 2010 Initiative) was formed and includes more than 30 different individuals and organizations. Focus groups were held to obtain information about why Arizonans were not getting the recommended amount of physical activity. The information gathered was used to develop a media campaign entitled "Feeling Great: It Happens When You Move!" This group collaborates with the Action for Healthy Kids Arizona State Team to increase the number of schools in Arizona that provide opportunities for daily physical activity during the school day, including during before and after school programs.

#### 5-A-Day

The ADHS nutrition programs have incorporated the 5-a-Day message into their public health and education programs. Since the start of this program in 1991, the BRFSS data indicates that adults are reporting an increase of 20 percent in eating 5 or more servings of fruits and vegetables a day.

#### **Arizona Nutrition Network (AzNN)**

This public and private partnership began in 1996 to bring people and programs together to deliver common nutrition messages to the low-income populations using social marketing approaches. The mission of the AzNN is to shape food consumption in a positive way, promote health and reduce disease among people living in Arizona.

The AzNN is funded through the U.S. Department of Agriculture, Food Stamp Nutrition Education Program (FSNEP) with activities limited to the food stamp eligible persons. It is the only FSNEP in Arizona and links social marketing efforts with community education programs utilizing common behavior change messages and materials based on formative research conducted with low-income individuals.

#### **Arizona Smoker's Helpline**

The Arizona Smokers' Helpline is a free telephone-based counseling, information, and referral system for Arizona residents who want to quit using tobacco products. The Helpline is a project under the Division of Health Promotion Sciences in the University of Arizona College of Public Health in Tucson, Arizona.

#### **Tobacco Media Campaigns**

#### **Ashes to Ashes**

A media campaign focused on the African American population in Arizona.

This campaign uses very strong language and powerful images to relay its message. The campaign also conveys a sense of urgency in quitting tobacco products and not passing the legacy of using them down to future generations.

#### Inhale Life/Be Tobacco Free

This is an integrated campaign that speaks to all demographics and ethnic groups, and the disparate populations statewide, across all messages. The messages fall into two categories: 1) Prevention/Positive lifestyle and 2) Cessation and Secondhand Smoke.

#### **School Based Tobacco Efforts**

The Tobacco Education and Prevention Program provides intensive prevention interventions with curricula in target schools reaching fourth through eight grade students. One-time prevention interventions in these same grades are done through guest speakers and the Phoenix Suns Gorilla. These interventions contain an education message on the harms of using tobacco.

#### **Community Tobacco Efforts**

#### **Healthy Kids Arizona**

This is an annual health fair for youth at a school district in Maricopa County. Activities include health screenings (vision, dental, diabetes, asthma, scoliosis), physical activity, and information for parents on a variety of health and health related issues.

#### **Local Project Events/Health Fairs**

County tobacco programs participate in community health fairs to provide information on the danger of tobacco use and secondhand smoke.

## **Appendix B**

#### **Abbreviations**

ACC American College of Cardiology

ADA American Dietetic Association/American Diabetes Association based on context

ADHS Arizona Department of Health Services

**AEDs** Automated External Defibrillators

AHA American Heart Association
ASA American Stroke Association

BMI Body Mass Index

**BRFSS** Behavioral Risk Factor Surveillance Survey

CAD Coronary Artery Disease
CDC Centers for Disease Control
CHF Congestive Heart Failure

**COPD** Chronic Obstructive Pulmonary Disease

CVA Cerebral Vascular Accident
CVD Cardiovascular Disease

**DM** Diabetes Mellitus

EMS Emergency Medical SystemGWTG Get With the GuidelinesHDL High-Density Lipoproteins

HLP HyperlipidemiaHTN Hypertension

LDL Low-Density Lipoproteins

MI Myocardial Infarction

MmHg Millimeters of Mercury

MNT Medical Nutrition Therapy

NHIS National Health Interview Survey

NHLBI National Heart, Blood & Lung Institute on the National Institutes of Health

PA Physical Activity

PSC Primary Stroke Centers

PVD Peripheral Vascular Disease

SCA Sudden Cardiac Arrest
SCD Sudden Cardiac Death

**VLDL** Very Low-Density Lipoproteins

## **Appendix C Glossary**

#### Abdominal fat (visceral fat)

Body fat stored in the large cavity of the trunk often around organs and is associated with increased risk of CVD.

#### **Acute coronary syndromes**

Rapid onset of an emergent situation related to disease of the coronary vascular system. Often referring to obstruction of the coronary arteries over a short period of time and related to thrombus. When treated with antithrombolytics during catherization there is often no detectable residual disease.

#### **Adoposity**

The level and amount of body fat stored in an area of the body or the entire body.

#### Age-adjusted mortality

The number of deaths occurring per 100,000 population per year, calculated in accordance with a standard age structure to minimize the effect of age differences when rates are compared between populations or over time.<sup>55</sup>

#### **Aneurysm**

Ballooning of a weakened portion of an arterial wall.

#### **Angina**

Chest pain caused by ischemia of the heart muscle and is referred to the chest, arm, neck, jaw and/ or back.

#### **Aorta**

Largest artery in the body, originating at the left ventricle and descending through the thorax and abdomen.

#### **Arrhythmia (dysrhythmia)**

Any disturbance or abnormality in the heart's normal rhythmic pattern. <sup>56</sup>

#### **Arterial insult**

Damage or ulceration to the lumen or interior of an artery caused by a variety of mechanisms some of which are unknown.

#### **Arteries**

Blood vessels that carry blood away from the heart. All arteries, with the exception of the Pulmonary Artery, carry oxygen and other nutrients from the heart to the body cells.

#### **Arteriosclerosis**

Arteri/o refers to the artery and sclerosis means "hardening".Hardening of the arteries.

#### **Atherosclerosis**

Hardening of fatty plaque deposited on the artery wall. <sup>56</sup> A pathological condition affecting the medium-sized and larger arteries, especially those that supply the heart (coronary arteries), the brain (the carotid and cerebral arteries), and the lower extremities (the peripheral arteries), as well as the aorta; underlies the occurrence of heart attacks, many strokes, peripheral arterial disease, and dissection or rupture of the aorta. <sup>55</sup>

#### Atherosclerotic cascade

The chain of events that begins with an insult or injury to the arterial wall and ends in stenosis of the artery.

#### **Automated external defibrillators**

A device used by a health professional or trained lay-rescuer that defibrillates or shocks the heart in the hope that an organized condution of the electrical impulse will be restored and effective mechanical function of the heart will resume. This device is automated so that it may be used with minimal training and available to the public in contrast to a standard defibrillator, which is used by healthcare professionals trained in the American Heart Association's Advanced Cardiac Life Support Certification.

#### **Baby boomers**

Those Americans born between 1946 and 1964, a period where the birthrate increased significantly when compared with the period before and after. This increase in population of this age group poses significant impact on CVD rates as well as stress on the healthcare system as baby boomers move through the lifespan.

# Behavioral Risk Factor Surveillance Survey (BRFSS)

A telephone survey that is administered nationally on an annual basis, and asks standardized questions aimed at assessing the prevalence of risk factors for a variety of diseases and threats to health and quality of life and to measure changes in the population's risk.

#### **Blood pressure**

The pressure, measured in millimeters of mercury (mmHg), exerted against the artery walls. Also considered to be the force required by the heart to move blood through the vascular system.

#### Diastolic blood pressure

The measurement of pressure in the arterial system during the resting phase of the cardiac cycle when the coronary arteries fill and perfusion of the myocardium takes place. Diastole refers to the resting of the heart

#### Systolic blood pressure

The measurement of pressure in the arterial system during the contraction of the heart when blood is forced out of the left ventricle into the arterial system.

#### **Body fat percentage**

The percentage of bodyweight that is predicted to be comprised of body fat. This excludes fat-free or lean body mass that would consist of muscle, organs and bone etc.

#### **Body Mass Index**

A height to weight ratio field measurement which is correlated to an increased risk for CVDs. BMI is in units of kg/m² and is derived by taking the bodyweight of an individual in kilograms and dividing it by the height of that individual in meters squared. Absolute values are used to interpret BMI in adults and CDC's published growth charts for age and gender are used to interpret BMI in children.

#### Cardiomegaly

Enlargement of the heart measured by increased mass and thickness of the septum and walls of the myocardium.

#### Cardiomyopathy

Literally means disease of the heart muscle and results in dilation of one or more chambers of the heart.

#### **Cardiovascular Disease**

May refer to any of the disorders that can affect the circulatory system, but often means coronary heart disease (CHD), heart failure and stroke taken together. <sup>55</sup>

#### Cerebral vascular accident (see stroke)

Interruption of blood supply to the brain caused by a cerebral thrombosis, cerebral embolism, or cerebral hemorrhage. The patient may experience mild to severe paralysis, also called stroke or brain attack.

#### Chain of survival

The steps that need to occur during a cardiac event to improve possible outcome. <sup>57</sup>

- 1. Prompt activation of 9-1-1.
- 2. Early cardiopulmonary resuscitation (CPR)
- 3. Rapid defibrillation
- 4. Timely advance life support.

#### Cholesterol (see hyperlipidemia)

A steroid alcohol present in animal cells and body fluids, importing in physiological processes, and implicated experimentally as a factor in arteriosclerosis. 58

# Chronic obstructive pulmonary disease (COPD)

A group of disorders that are almost always a result of smoking that obstructs bronchial flow. One or more of the following in varying degrees are present in COPD: emphysema, chronic bronchitis, bronchospasm, and bronchiolitis.

#### Congenital heart diseases

Heart abnormalities present at birth.

## Congestive Heart Failure (also called heart failure)

Impairment of the pumping function of the heart as the result of heart disease; heart failure often causes physical disability and increased risk for other CVD events. Inability of the heart to pump enough blood through the arterial system to supply the tissues and organs. CHF is diagnosed by measuring the percentage of blood in a chamber of the heart that is pumped out during systole (see left ventricular ejection fraction or LVEF).

#### **Coronary arteries**

The arteries that supply blood to the heart muscle and whose narrowing or occlusion constitutes coronary artery disease (CAD) and can precipitate a heart attack.

#### **Coronary Heart Disease**

Heart disease caused by impaired circulation in one or more coronary arteries; often manifests as chest pain (angina) or heart attack (myocardial infarction). <sup>55</sup>

#### **Defibrillation (cardiac defibrillation)**

Application of an electric shock to the myocardium through the chest wall to restore normal cardiac rhythm.

#### **Diabetes mellitus (Diabetes)**

A metabolic disorder resulting from insufficient production or utilization of insulin, commonly leading to cardiovascular complications. <sup>55</sup>

#### **Diastole**

The relaxation phase of the cardiac cycle.

#### **Dyslipidemia**

An abnormal lipid profile without necessarily having high blood cholesterol. For example individuals with low HDL cholesterol and a high HDL to total cholesterol ratio but borderline total cholesterol values.

#### **High-density lipoproteins**

Lipoprotein of blood plasma that is composed of high proportion of protein with little triglyceride and cholesterol and that is associated with decreased probability of developing atherosclerosis.

#### **Low-density lipoproteins**

Lipoprotein of blood plasma that is composed of a moderate proportion of protein with little triglyceride and high proportion of cholesterol and that is associated with increased probability of developing atherosclerosis.<sup>58</sup>

#### **Electrolyte**

A substance (acid, base or salt that when dissolved in a suitable solvent becomes a suitable conductor. Electrolytes are necessary for many physiological processes especially muscle contraction and electrical conduction. Electrolyte abnormalities can be lethal and are a common complication related to CHF.

#### **Embolus**

Blood clot or foreign material, such as air or fat, that enters the bloodstream and moves until it lodges at another point in the circulation. (compare to Thrombus)

#### **Exercise**

A subclass of physical activity that is planned, structured, and repetitive bodily movement done to improve or maintain one or more component of physical fitness.<sup>59</sup>

#### Heart disease (disease of the heart)

Any affliction that impairs the structure of function of the heart (e.g., atherosclerotic and hypertensive diseases, congenital heart disease, rheumatic heart disease, and cardiomyopathies). 555

#### **Heart Valves**

Structure of the heart that directs the flow of blood from chamber to chamber and to the lungs and the aorta.

#### **Tricuspid valve**

Located between the right atrium and right ventricle. <sup>56</sup>

#### Mitral valve

A bicuspid valve between the left atrium and the left ventricle. 56

#### **Pulmonary valve**

A semilunar valve located between the right ventricle and the pulmonary artery.

#### **Aortic valve**

A semilunar valve located between the left ventricle and the aorta. 56

#### Hemorrhagic stroke

Also called a bleeding stroke. Sudden interruption of blood flow to the brain caused by disruption of blood flow due to loss of integrity and bleeding from the artery. Common causes are dissecting aneurysm and trauma.

#### **High Blood Pressure (see hypertension)**

A condition in which the pressure in the arterial circulation is greater than desired; associated with increased risk for heart disease, stroke, chronic kidney disease, and other conditions; blood pressure is considered "high" if systolic pressure (measured at the peak of contraction of the heart) is ≥140 mmHg or if diastolic pressure (measured at the fullest relaxation of the heart) is ≥90 mmHg.

#### Hyperlipedemia

A high blood concentration of a family of lipid or "fatty" molecular compounds obtained directly from the diet or produced in the body form fatty dietary components; a necessary factor in development of Atherosclerosis; total cholesterol concentrations is classified as high if it is  $\geq$ 200mg/dl.

#### Hypertensive disease

Diseases caused by prolonged or chronic hig blood pressure including cerebral vascular disease chronic kidney disease, and heart diseases including coronary artery disease, valvular heart disease, cardiomyopathies and cardiomegalies.

#### Intracranial bleeding (see hemorrhagic stroke)

A condition where the integrity of the cerebral arteries is compromised causing bleeding into the intracranial space; sometimes causing an increase in pressure in the cranium. Individuals who take anticoagulant medication or other medication that slows the clotting time of blood are at increased risk of intracranial bleeding.

#### **Ischemia**

Deficiency of blood <sup>56</sup>; a condition where the oxygen demand of tissue exceeds oxygen supply so there is a deficit. Prolonged ischemia will lead to necrosis of tissue.

## Ischemic heart disease (see coronary arter disease)

Heart disease caused by ischemia generally due to coronary artery disease.

#### **Ischemic stroke**

Stroke caused by ischemia mainly due to atherosclerosis in the carotid, vertebral, cerebral arteries and/or thrombus or embolism.

## Kidney disease (chronic kidney failure/see renal artery disease)

Conditions that affect the kidney or function of the kidney and can lead to CVDs, electrolyte imba ances, hypertension and other adverse physiological consequences. A common cause of kidney disease is atherosclerosis in the renal artery.

## Left Ventricular Ejection Fraction (LVEF see congestive heart failure)

The percentage of blood in the left ventricle at the end of diastole that is ejected from the left ventricle after systole. The LVEF is an index for diagnosing CHF and stratifying the risk associated with CHF.

#### Lesion (see plaque)

An abnormal change in structure of an artery due to injury or disease.

#### Major-modifiable risk factors for CAD

Attributes or characteristics of a person's lifestyle, which predisposes them to develop coronary artery disease. Major modifiable risk factors have met criterion of disproportionate risk, dose response, independence, and proposed mechanism and among others

#### Disproportionate risk

A disproportionate increase in developing CVDs related to a single risk factor; a relative risk of 1.3 is often considered as a threshold for disproportionate risk.

#### **Dose Response**

A relationship that between the presence of a risk factor and its deleterious effect; i.e. a person who smokes the longest or the most would also have more significant CVD and/or diffuse CVD.

#### Independence

A given risk factor independently causes CVD through proposed mechanisms rather than mediating its effect through other conditions; in addition independent risk factors can also mediate the risk for developing CVD through other risk factors. For example physical inactivity in and of itself causes CVD but may also worsen CVD risk by negatively modifying the non exerciser's cholesterol profile.

#### Medical nutrition therapy

A comprehensive, evidence-based assessment involving patients who are at risk and who are likely to benefit from therapy based on nutrition practice guidelines. MNT is generally provided by a registered dietician and became a reimbursable benefit by Medicare in January 2002.

#### Metabolic syndrome

A collection of physiological markers that are thought to be precursors to type II diabetes and CVD and may be a link between the two diseases. These physiological markers are: abdominal fat, low-levels of high-density lipoprotein, high levels of triglyceride, and high blood pressure, secondary findings may include elevated liver enzymes and hyperinsulinemia.

#### **Morbidity**

The extent of illness, injury or disability in a defined population.

#### **Mortality**

Rate of death expressed as the number of deaths occurring in a population of given size within a specified time interval (e.g. 265 annual deaths from heart disease per 100,000 U.S. Hispanic women, 1991-1995). 55

#### Myocardial infarction (see heart attack)

An acute event in which the heart muscle is damaged because of a lack of blood flow from the coronary arteries, typically accompanied by chest pain and other warning signs but sometimes occurring with no recognized symptoms (i.e. silent heart attack)

#### **National Health Interview Survey (NHIS)**

A cross-sectional household interview survey, administered by the National Center for Health Statistics (NCHS), which is a principal source of information on the health of the U.S. civilian population.

#### Non-modifiable risk factors

Risk factors that are not amenable to modification by an individual such as increased age, family history, gender and ethnicity.

#### Obesity

Often defined in terms of body mass index (BMI), which is calculated as bodyweight in kilograms (1kg=2.2lbs) divided by height in meters (1M=39.37 inches) squared; a BMI of  $\geq$  30.0 kg/m<sup>2</sup> is considered "obese."

#### **Overweight**

Often defined in terms of body mass index (BMI), which is calculated as bodyweight in kilograms (1kg=2.2lbs) divided by height in meters (1M=39.37 inches) squared; a BMI of 25-29.9 kg/m<sup>2</sup> is considered overweight. In children, the CDC defines overweight as BMI greater than the 95<sup>th</sup> percentile value for the same age and gender group.

#### Peripheral edema

A puffing, swelling of tissue in the extremities (usually the lower extremities) from the accumulation of fluid in the extra-cellular space; often a consequence of CHF.

#### Peripheral vascular disease

Mainly atherosclerosis of the extremities; especially important in lower extremities; also called peripheral vascular disease. <sup>55</sup>

#### Physical Activity (see exercise)

Bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure.<sup>59</sup>

#### **Plaque**

The characteristic manifestation of atherosclerosis located in the arterial wall and extending into the lumen or channel of the artery; plaque can disturb or restrict blood flow and is prone to fissure or rupture, thus precipitating formation of a blood clot that can cause an acute coronary event.

#### **Pre-hypertensive**

A range of blood pressure from 120/80mmHg to 139/89 mmHg that signifies the importance of an individual to start lifestyle modifications that may prevent developing high blood pressure.

#### **Prevalence**

The frequency of a particular condition within a defined population at a designated time (i.e. 12.6 million Americans living with heart disease in 1999 or 36.4% of African American men aged 20-74 years found to have hypertension in a survey conducted in 1988-1994.

#### Primary (essential) hypertension

Hypertension with an unknown cause representing approximately 95% of diagnosed cases of hypertension.

#### **Primary prevention of CVDs**

Interventions, including the detection and control of risk factors, designed to prevent the first occurrence of heart attack, heart failure, or stroke among people with identifiable risk factors.

#### **Primary stroke centers**

Key elements of primary stroke center include acute stroke teams, stroke units, written care protocols, and an integrated emergency response system. Important support services include availability and interpretation of computed tomography scans 24 hours everyday and rapid laboratory testing. Administrative support, strong leadership, and continuing education are also important elements for stroke centers. Adoption of these recommendations may increase the use of appropriate diagnostic and therapeutic modalities and reduce peristroke complications.

#### **Primordial prevention of CVD**

Interventions targeting people without (known) risk factors or CVD (including the maintenance or restoration of favorable social and environmental conditions and the promotion of healthy behavioral patterns) to prevent development of risk factors.<sup>55</sup>

#### Population-wide approach:

Intervention strategy that targets the population as a whole without regard to the risk levels of various subgroups; distinguished form and complementary to the high-risk approach. <sup>55</sup>

#### **Pulmonary edema**

Abnormal accumulation of fluid in the lungs and a common complication of CHF or chronic kidney disease.

#### Pulmonary heart disease

Impaired function of the right ventricle resulting in poor perfusion into the lungs and insufficient oxygenation.

#### Renal artery disease

Arteriosclerosis in either of the renal arteries that branches off the abdominal aorta to each kidney. This is the largest known cause of hypertension called secondary or non-essential hypertension.

#### Rheumatic heart disease

Damage to the heart muscle or heart valves caused by one or more episodes of rheumatic fever. Rheumatic fever is an inflammatory disease, usually occurring in children and often following an upper respiratory tract streptococcal infection.

# Secondary hypertension (see renal artery disease)

Approximately 5% of the diagnosed cases of hypertension where the cause can be identified; atherosclerosis in the renal artery is the leading cause of secondary hypertension.

#### **Secondary prevention of CVDs**

A set of interventions aimed at survivors of acute CVD events (i.e. heart attack, heart failure, stroke) or others with known CVD in which long-term case management is used to reduce disability and risk for subsequent CVD events.

## Silent Ischemia (see silent myocardial infarction)

Ischemia of the heart muscle that does not result in angina.

#### **Stenosis**

A narrowing or constriction of the diameter of a bodily passage or oriface commonly in CVD to be found in an artery or heart valve.

#### **STOP Stroke Act**

Legislation aimed at ensuring that stroke is more widely recognized by the public and treated more effectively by healthcare professionals. STOP stands for stroke treatment and ongoing prevention.

#### **Stroke**

Sudden interruption of blood supply to the brain caused by an obstruction or the rupture of a blood vessel. <sup>55</sup>

#### Sudden cardiac arrest

An acute emergency where the heart no longer provides cardiac output at a level which supports the victims life; mainly caused by arrhythmia which can be best treated by rapid defibrillation of the heart.

#### Sudden cardiac death

The result of sudden cardiac arrest with unsuccessful resuscitation.

#### **Systole**

The contraction phase of the cardiac cycle where blood is moved through the arterial system and arterial pressure rises.

#### **Telemedicine**

An attempt to overcome geographical barriers to care by using video-conferencing, high speed data transmission, telemetry and other communication technology to provide consults, clinical and diagnostic data and allow urban facilities to tap into rural resources.

#### **Thrombus**

A clot formed within a blood vessel and remaining attached to its place of origin (compare Embolus). <sup>59</sup>

#### Vascular disease

Diseases which effect the arteries including but not limited to aneurisms, atherosclerosis, and arteriosclerosis and is the underlying mechanism in major forms of cardiovascular disease effecting the brain, heart, kidneys and extremities.

#### **Veins**

Blood vessels that carry blood from the capillaries toward the heart and have thinner walls than the arteries and often valves at interval to prevent reflux of the blood which flows in a steady stream and is in most cases dark-colored due to the presence of reduced hemoglobin.

#### **Waist to Hip Ratio**

The circumference of the waist divided by the hips; an index of risk related to body fat which is sensitive to body fat patterning; the pattern of body fat distribution is recognized as in important predictor of the health risks of obesity. 59

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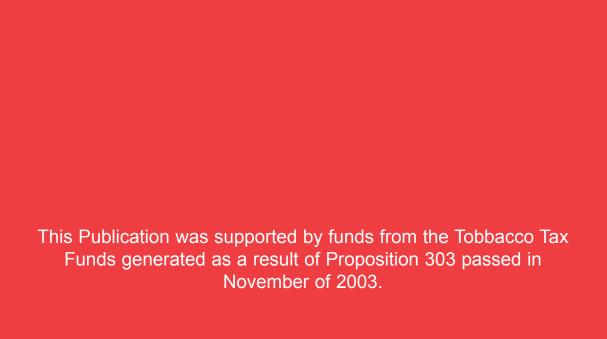
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